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**(54) SPUTTERING APPARATUS**

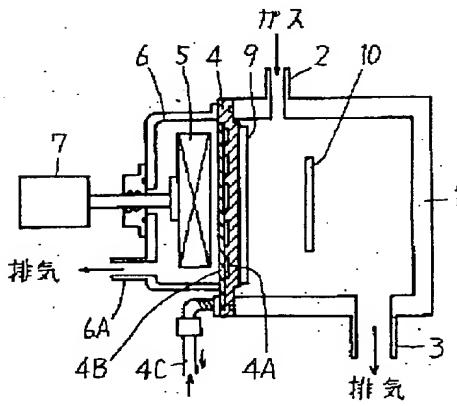
**(57) Abstract:**

**PURPOSE:** To thin a backing plate and to strengthen the control of film quality, in a sputtering apparatus by sealing a jacket for cooling water at the rear of a backing plate for holding a target with a cover or evacuating the inside of a magnet chamber at the rear of the backing plate.

**CONSTITUTION:** At the time of evacuating the inside of a sputtering chamber 1 provided with the substrate 10 to be treated and a target 9 by an exhaust port 3, introducing a gas for electric discharge from a gas introducing port 2 under a low pressure and forming the thin film of the target 9 material on the surface of the substrate 10 by glow discharge, a jacket 4A for water cooling provided at the rear of the backing plate 4 of the target 9 is provided with a cover 4B fixed by silver solder, and the pressure of the water cooling applied to the backing plate 4 is released, or furthermore, the inside of a magnet chamber 6 charged with a magnet 5 for magnetron sputtering is evacuated to a low pressure similar to that in the sputtering chamber 1. The thickness can be reduced without the deformation of the backing plate 4 caused by pressurizing in a direction of the sputtering chamber 1, and the control of the film

quality of the thin film on the substrate 10 by the magnetic field of the magnet 5 can be made easy.

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**CLAIMS**

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[Claim(s)]

[Claim 1] The sputtering system characterized by having the back up plate which covers and enabled it to let cooling water flow in this jacket from a rear face at the back-up-plate main part which holds the target which is spatter material on a front face, and engraved the rear face with the jacket for water cooling.

[Claim 2] The sputtering system characterized by being the structure which has the magnet room which holds a target on a front face and holds the magnet for magnetron sputtering at the rear face, and this magnet room is airtight and can exhaust.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Industrial Application] this invention relates to a sputtering system and relates to the back up plate of a spatter gun, and the structure of a magnet room especially.

[0002] A sputtering system is a semiconductor device and LCD. In the manufacture process of equipment, it is widely used for membrane formation of various films. The back up plate of a spatter gun is a plate which sets spatter material (target).

[0003] In recent years, at the membrane formation process by the spatter, with enlargement of the substrate formed membranes, the target diameter[ of macrostomia ]-ized, the weight of a back up plate also became heavy and handling had become difficulty. Moreover, in order to control membranous quality, it has come to raise the magnetic field intensity of magnetron sputtering. Furthermore, the influence of contamination by the particle needs to be reduced.

#### [0004]

[Description of the Prior Art] Although the conventional spatter gun had a planar type and a earthenware mortar type, the whole surface erosion type (magnetron-sputtering method) which is effective at particle reduction is introduced into a planar type, and it has become in use [ a planar type ].

[0005] Drawing 3 is the cross section of the planar type magnetron sputtering by the conventional example. drawing -- setting -- 1 -- a spatter room and 2 -- a gas inlet and 3 -- for a permanent magnet and 7, as for a cooling water entrance and 9, a motor and 8 are [ an exhaust port and 4 / a back up plate and 5 / a target and 10 ] processed substrates

[0006] With the planar type, the structure where most rotates a permanent magnet 5 is taken as a method of forming into whole surface erosion. The spatter gun in this case has taken the structure which uses a back up plate 4 as a hat type, and sets a rotation magnet into it, and lets cooling water flow.

#### [0007]

[Problem(s) to be Solved by the Invention] When the hat type back up plate of the conventional example is used Since cooling water is poured in the back up plate, the sum of atmospheric pressure and water pressure must make the thickness of a back up plate increase to a back up plate so that these pressures can be borne for this reason, when it enlarges.., This, In order to control membranous quality, a result which bars that it is going to raise magnetic field intensity is brought.

[0008] this invention thin-shape-izes a back up plate, raises magnetic field intensity, and enables membranous control. Lightweight-izing of a back up plate, It aims at aiming at rust prevention of a magnet.

#### [0009]

[Means for Solving the Problem] Solution of the above-mentioned technical problem has the sputtering system which has the back up plate of the structure which covers and can let cooling water flow in this jacket from a rear face at the back-up-plate main part which holds the target which is spatter material on one front face, and engraved the rear face with the jacket for water cooling, or the magnet room which holds a target on two front face, and holds the magnet for magnetron sputtering at a rear face, and is attained by the sputtering system characterized by to be the structure which this magnet room is airtight and can exhaust.

[0010]

[Function] In this invention, the jacket for water cooling is carved in a back up plate. Since it covers by silver soldering and is letting cooling water flow A part for water pressure is removed among the force made to transform a back up plate, and it is considering only as a part for atmospheric pressure. Further, In order to make a back up plate thin The rotating magnet is put into a magnet room. A magnet room is decompressed like a spatter room and it is made for atmospheric pressure not to be applied to a back up plate.,

[0011] By the bird clapper, the magnetic field intensity on the front face of a target which carries out an operation of magnetron sputtering becomes [ a back up plate ] thin strongly, and it is a horizontal component (component parallel to a target front face) also with a permanent magnet rotation type. The intensity of 700 gauss or more can be attained easily, and the membranous control by magnetism is attained.

[0012]

[Example] Drawing 1 is the cross section of the planar type magnetron-sputtering equipment by the example of this invention.

[0013] the jacket for water cooling with which a gas inlet and 3 were carved for a back-up-plate main part and 4A by the exhaust port, and 4 was carved [ 1 ] for a spatter room and 2 by the back-up-plate main part in drawing -- for a permanent magnet and 6, as for a motor and 9, a magnet room and 7 are [ the lid with which silver soldering of the 4B was carried out, and 4C / the entrance of cooling water, and 5 / a target and 10 ] substrates

[0014] In the example, since atmospheric pressure is not applied to a back up plate by exhausting the magnet room 6 like the spatter room 1, the back up plate is thin-shape-sized.

[0015] Since a back up plate has the structure shown in drawing 3 , cooling water flows the inside of a back up plate, and its cooling efficiency is still better. Drawing 2 is the plan of the back up plate of an example.

[0016] Water-jacket 4A shown by the dotted line in drawing, By lid 4B, silver soldering is carried out to the back-up-plate main part 4, and it is formed, and is drawn outside by entrance 4C of cooling water.

[0017]

[Effect of the Invention] According to this invention, since a back up plate is thin-shape-sized, magnetic field intensity is raised and membranous control is enabled. And lightweight-izing, now handling become [ a back up plate ] easy. Moreover, since a magnet cannot touch direct cooling water, rust prevention of a magnet can be cut, and a longevity life can be expected. Moreover, the cooling efficiency of a target becomes very high. The cooling effect is not affected even if it furthermore changes the distance between a magnet and a back up plate arbitrarily.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The cross section of the planar type magnetron-sputtering equipment by the example of this invention

[Drawing 2] The plan of the back up plate of an example

[Drawing 3] The cross section of the planar type magnetron-sputtering equipment by the conventional example

[Description of Notations]

1 is a spatter room.

2 Gas Inlet

3 Exhaust Port of Spatter Room

4 Back-Up-Plate Main Part

4A The jacket for water cooling carved by the back-up-plate main part

4B The lid by which silver soldering was carried out

4C The entrance of cooling water

5 Permanent Magnet

6 Magnet Room

6A The exhaust port of a magnet room

7 Motor

8 Cooling Water Entrance

9 Target

10 Substrate

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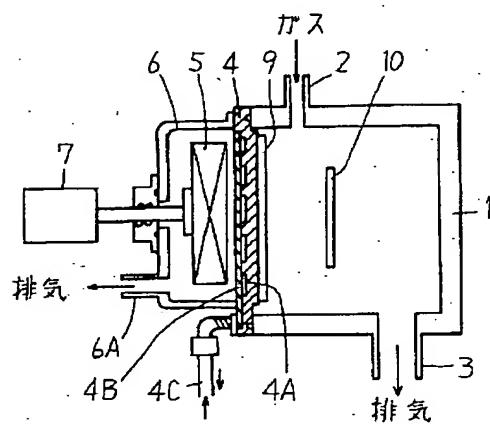
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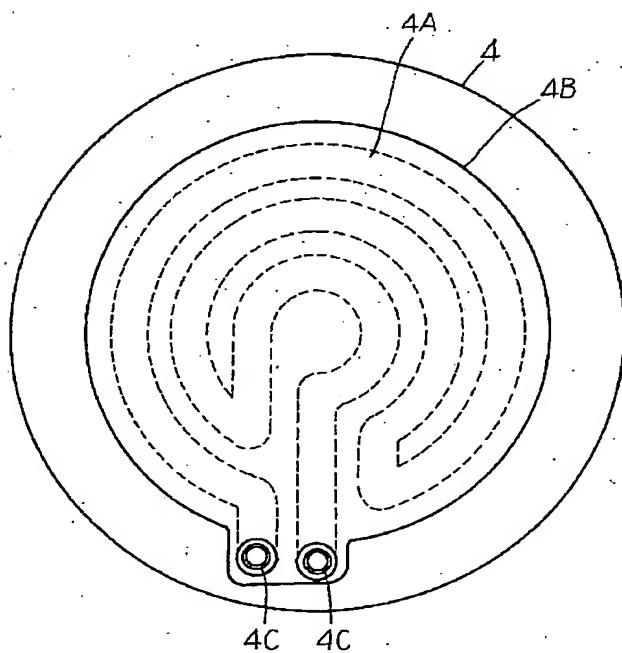
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## DRAWINGS

[Drawing 1]  
実施例の断面図

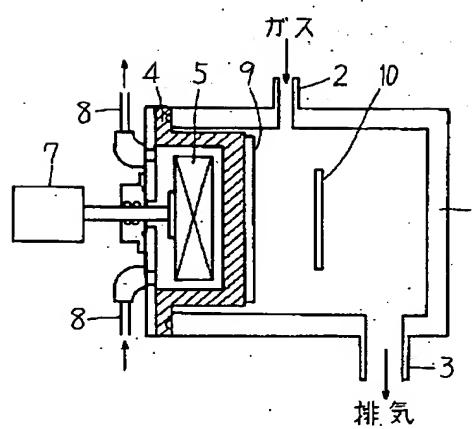


[Drawing 2]  
実施例のパッキンプレートの平面図



[Drawing 3]

従来例の断面図



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